

WE CLAIM

1. Face detection apparatus generating an output indicative of the likelihood of test
5 regions of a test image containing a face, the apparatus comprising:

(i) logic to derive a plurality of sets of image attribute data from a test region, each set relating to said test region scaled by a respective different scaling factor from a geometric progression of scaling factors, said progression being such that each scaling factor is related to a next scaling factor by a predetermined multiplicative factor, said factor being the same
10 across the whole progression of scaling factors;

(ii) a first comparator to compare said derived attributes for each scaling factor with a first respective set of attributes indicative of the presence of a face to generate a first respective likelihood value;

(iii) a second comparator to compare said derived attributes for each scaling factor
15 with a second respective set of attributes indicative of the presence of a face to generate a second respective likelihood value;

(iv) a generator to generate a combined likelihood value in respect of at least a subset of said scaling factors by combining the first likelihood value applicable to that scaling factor with the second likelihood value applicable to a further scaling factor separated from that scaling factor in the geometric progression by a predetermined number of positions; and
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(v) logic to derive a probability of the presence of a face at each scaling factor in the subset by a similarity between said derived attributes and said combined likelihood value in respect of that scaling factor.

25 2. Apparatus according to claim 1, in which:

(i) said second sets of attributes are indicative of the presence of a central portion of a face in said test region; and

(ii) said generator is operable to combine the first likelihood value applicable to a scaling factor at which said test region represents a certain area of said test image with said
30 second likelihood value applicable to a further scaling factor in which said test region represents a smaller area of said test image.

3. Apparatus according to claim 1, arranged to derive a combined likelihood value which, across said progression of scaling factors, is indicative of the highest likelihood of a face being present in that test region.
- 5 4. Apparatus according to claim 1, said apparatus being operable to compare likelihood values across a plurality of different test regions to detect a likelihood value which, across said progression of scaling factors and across said plurality of test regions, is indicative of the highest likelihood of a face being present.
- 10 5. Apparatus according to claim 1, in which the predetermined multiplicative factor is $\sqrt[4]{2}$.
6. Apparatus according to claim 1, in which said generator is operable to combine said first likelihood value applicable to a scaling factor with said second likelihood value
15 applicable to a further scaling factor separated from that scaling factor in said geometric progression by three positions.
7. Video conferencing apparatus comprising apparatus according to claim 1.
- 20 8. Surveillance apparatus comprising apparatus according to claim 1.
9. A method of face detection for generating an output indicative of the likelihood of test regions of a test image containing a face, said method comprising the steps of:
25 (i) deriving a plurality of sets of image attribute data from a test region, each set relating to said test region scaled by a respective different scaling factor from a geometric progression of scaling factors, said progression being such that each scaling factor is related to a next scaling factor by a predetermined multiplicative factor, said factor being said same across the whole progression of scaling factors;
30 (ii) comparing said derived attributes for each scaling factor with a first respective set of attributes indicative of the presence of a face to generate a first respective likelihood value;

(iii) comparing said derived attributes for each scaling factor with a second respective set of attributes indicative of said presence of a face to generate a second respective likelihood value;

5 (iv) generating a combined likelihood value in respect of at least a subset of the scaling factors by combining said first likelihood value applicable to that scaling factor with said second likelihood value applicable to a further scaling factor separated from that scaling factor in said geometric progression by a predetermined number of positions; and

10 (v) deriving a probability of said presence of a face at each scaling factor in said subset by a similarity between said derived attributes and said combined likelihood value in respect of that scaling factor.

15 10. Computer software having program code for carrying out a method according to claim 9.

11. A providing medium for providing program code according to claim 10.

20 12. A medium according to claim 11, said medium being a storage medium.

13. A medium according to claim 12, said medium being a transmission medium.